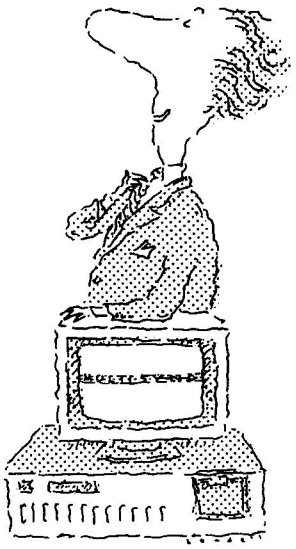
C&C Computers and Communications

MULTISYNC™

JC-1401P3E/EE/R

The Intelligent Monitor

USER'S MANUAL



NEC

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CHAPTER 1. INTRODUCTION

1.1 GENERAL

MultiSync, The Intelligent Monitor, from NEC, is a high resolution color monitor that automatically adjusts to graphics board scanning frequencies from 15.5 KHz to 35 KHz.
MultiSync gives IBM PC, PC/XT and PC/AT users crisp text and vivid color graphics displays when used with any of the three IBM graphics adapters (the CGA, EGA or PGA)
MultiSync can also be used with other IBM compatible graphics adapters to provide IBM users with the widest range of color monitor compatibility and capability available in the market place.

1.2 FEATURES OF MULTISYNC

- MultiSync automatically scans all frequencies between 15.5 kHz and 35 kHz.
- MultiSync is compatible with the IBM PC, PC/XT, PC/AT and look-alikes.
- MultiSync is compatible with the IBM Professional Graphics Adapter, the IBM Enhanced Graphics Adapter, the IBM Color Graphics Adapter and other IBM compatible graphics adapters.
- MultiSync's wide compatibility makes it possible to upgrade boards or software without purchasing a new monitor.
- MultiSync has a maximum horizontal resolution of 800 dots and a maximum vertical resolution of 560 lines for superior clarity of display.
- MultiSync offers both TTL and ANALOG signal inputs, and in the ANALOG mode can display an unlimited palette of colors depending on the graphics board and software being used.
- MultiSync features a TEXT SWITCH with a choice of seven colors (red, blue, green, cyan, yellow, white and magenta) displaying word processing, spread sheets, databases or other software in crisp alphanumeric text on a dark-bulb black background.
- MultiSync has a 14 inch diagonal display and a large, 13 inch viewing area.

1.3 CAUTIONS WHEN USING MULTISYNC

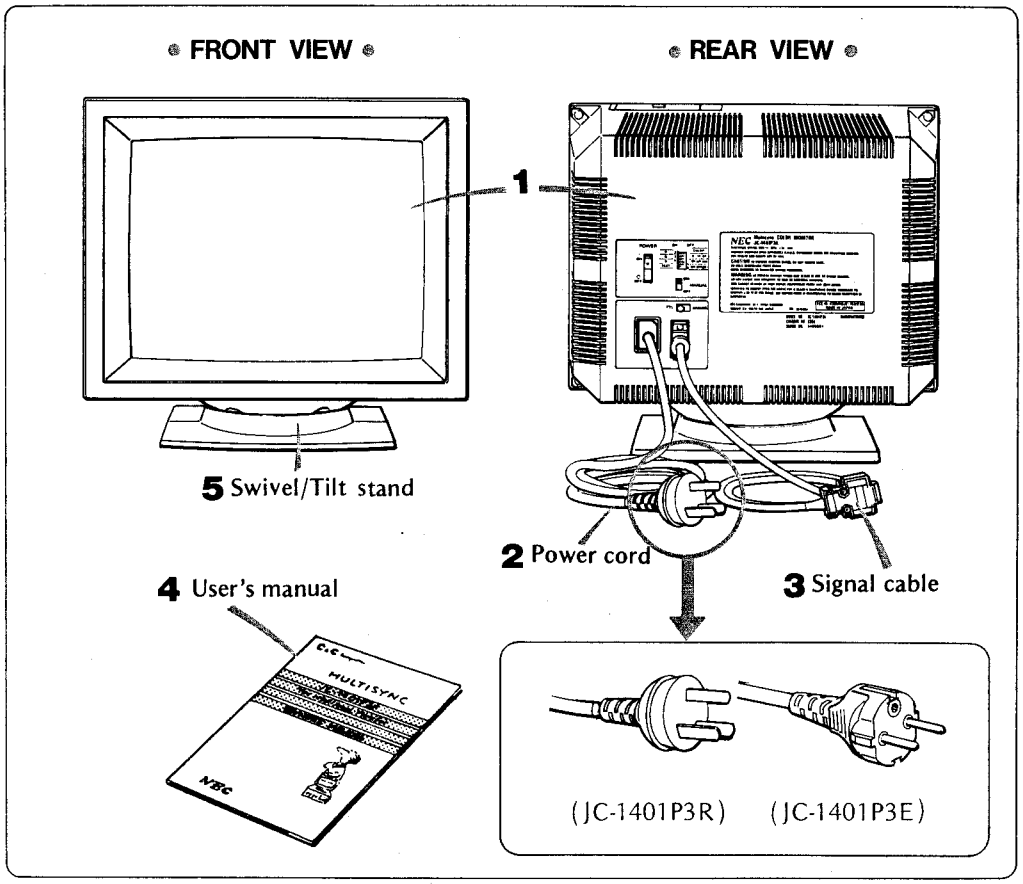
When setting up and using MultiSync pay special attention to these points.

- To eliminate eye fatigue, don't use MultiSync against a bright background or where the sun or other lights can directly shine on it.
- For optimum viewing, MultiSync should be just below eye level.
- Allow adequate ventilation all around MultiSync so that heat from the monitor can properly dissipate.
- Don't rest MultiSync or other heavy objects on the power cord. A damaged power cord can cause fires or electrical shocks.
- Keep MultiSync away from high capacity transfromers, electric motors and other strong magnetic fields.
- Don't drop MultiSync when transporting it.
- Don't use MultiSync in damp, dusty, or dirty places.

CHAPTER 2. USING MULTISYNC

2.1 MEETING MULTISYNC, THE INTELLIGENT MONITOR

Refer to the diagram below to be sure that your MultiSync package includes all the items in this picture. Save the original box and packing materials in case you have to ship or transport MultiSync.



1. MultiSync (monitor)

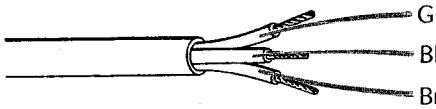
2. Power cord: Plug form different by model.

JC-1401P3EE

Warning: This apparatus must be earthed.

Important

The wires in this mains lead are colored in accordance with following code:



Green and yellow : Earth

Blue : Neutral

Brown : Live

3. Signal cable: Connects MultiSync to the IBM PGA, EGA or CGA graphics boards.

4. User's manual

5. Swivel/Tilt stand: Enables you to position MultiSync at the best angle and tilt for easy viewing.

2.2 ADJUSTING MULTISYNC CONTROLS

Before connecting MultiSync with IBM personal computers or compatibles and IBM graphics adapters, take time to familiarize yourself with the switches and controls that give MultiSync all its capabilities. Chapters 2.2.1 and 2.2.2 outline the control and switches of MultiSync. Chapter 2.3 shows you how to connect MultiSync with your IBM personal computer and graphics adapter. And Chapter 2.4 includes a quick operation chart summarizing the steps necessary to connect and adjust MultiSync for the optimum in high resolution color display viewing.

2.2.1 ADJUSTING THE REAR CONTROLS

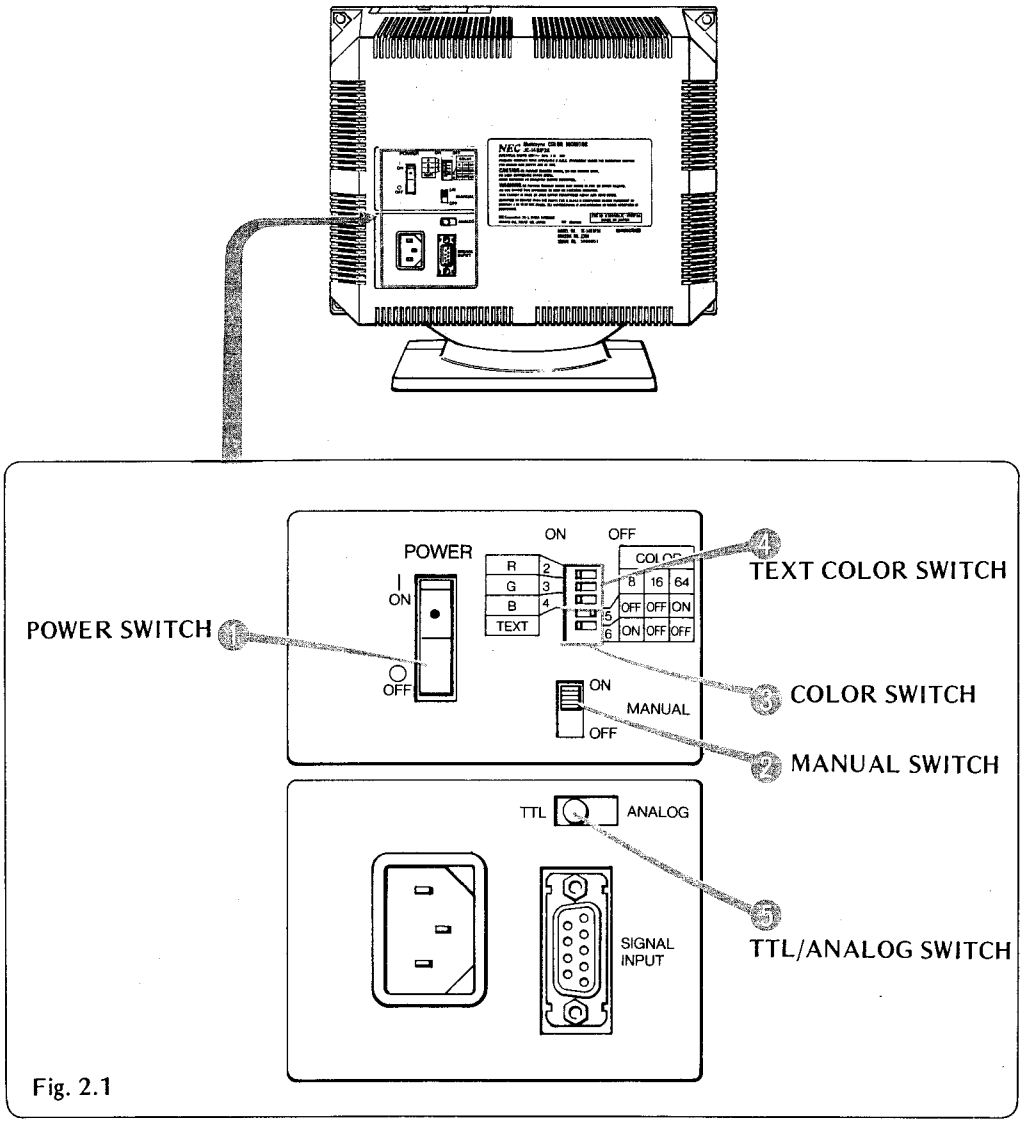


Fig. 2.1

⑭ POWER SWITCH

Used to turn the power ON or OFF. When the power is ON, the power indicator is lit.

⑮ MANUAL SWITCH

This switch selects either the IBM mode when OFF or the manual mode when ON.

When this switch is OFF, MultiSync automatically works in the IBM mode and adjusts itself to the scanning frequency, resolution and color requirements of the IBM compatible graphics adapter being used.

When this switch is ON, the user must manually select the number of colors (8/16/64) needed by the graphics adapter being used with the COLOR SWITCH (see No. ⑯ below). Refer to instructions accompanying the graphics adapter being used for information on how many colors the adapter can display.

⑯ COLOR SWITCH

The three color configurations (8/16/64 colors) necessary when using non-IBM compatible graphics adapters can be set using No. 5 and 6 of the dip switches as shown below. Refer to instructions accompanying the graphics adapter being used for information on how many colors the adapter can display.

COLOR MODE	DIP SWITCH	
	No. 5	No. 6
8 colors	OFF	ON
16 colors	OFF	OFF
64 colors	ON	OFF
UNUSED	ON	ON

NOTE

These switches should be set correctly in relation to the input signal of the graphics adapter being used. Refer to instructions accompanying the graphics adapter for information on the input signal and refer to No. ⑰ below.

⑰ TEXT COLOR SWITCH

Refer to No. ⑰ TEXT in Chapter 2.2.2 ADJUSTING THE TOP CONTROLS for full information on using the TEXT SWITCH.

⑱ TTL/ANALOG SWITCH

Used to select an input video signal – either TTL or ANALOG – of the graphics adapter. It is important to determine whether the input signal of the graphics adapter being used is ANALOG or TTL prior to connecting the adapter with your personal computer. Refer to instructions accompanying the graphics adapter for information on the input signal.

2.2.2 ADJUSTING THE TOP CONTROLS

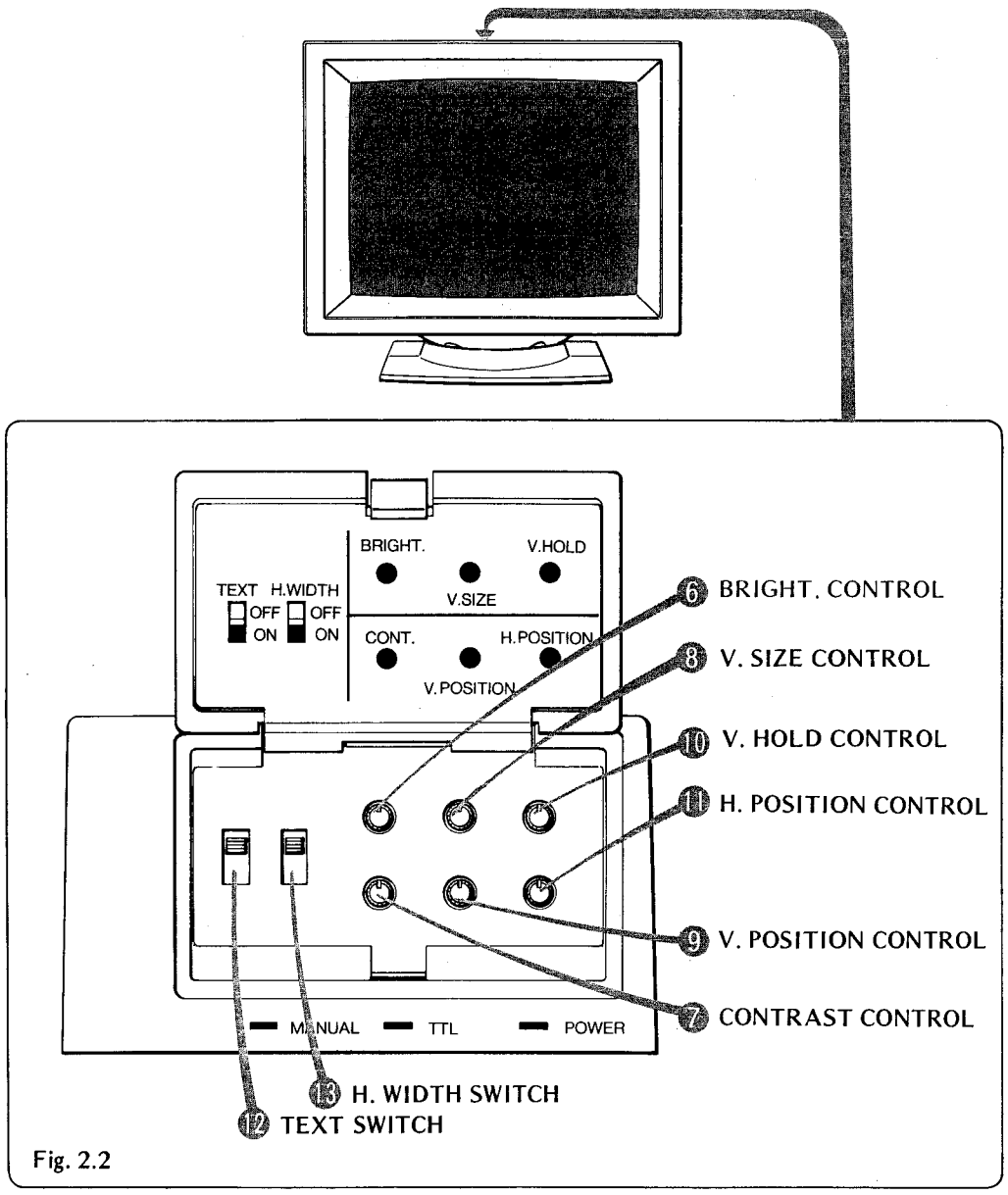


Fig. 2.2

6 BRIGHT. CONTROL

Used to adjust the picture brightness of the screen.

7 CONTRAST CONTROL

Adjusts the display to the contrast preferred by the user.

❽ V. SIZE CONTROL

Turn this knob for the proper vertical size of the display. Turn the knob clockwise for a larger display; turn it counterclockwise for a smaller display.

❾ V. POSITION CONTROL

Turn this knob for the proper vertical position of the display. Turn the knob clockwise for a lower display position; turn it counterclockwise for a higher display position.

❿ V. HOLD CONTROL

Adjusts the vertical stability of the display. Please adjust the V. HOLD CONTROL so that CONTROL position is center of the hold range for proper picture.

⓫ H. POSITION CONTROL

Turn this knob for the proper horizontal position of the display. Turn the knob clockwise to reposition display to the right; turn it counterclockwise to reposition to the left.

⓬ TEXT SWITCH

This switch controls the text mode of MultiSync.

When it is ON, the text of the display will appear in one color selected by the TEXT COLOR SWITCH (No. 2, 3 and 4 of the dip switch on the rear of MultiSync), regardless of the colors of the software program being used.

When it is OFF, the color of the software program being used will again be displayed.

The diagram below of the dip switches shows how to display text in your choice of seven colors.

TEXT COLOR	DIP SWITCH		
	2 R	3 G	4 B
RED	ON	OFF	OFF
GREEN	OFF	ON	OFF
BLUE	OFF	OFF	ON
YELLOW	ON	ON	OFF
CYAN	OFF	ON	ON
MAGENTA	ON	OFF	ON
WHITE	ON	ON	ON

NOTE

The text switch works only in the TTL mode.

⓭ H. WIDTH SWITCH

Adjust this switch for the horizontal size of display preferred. When this switch is ON, the width of the display size changes.

2.3 CONNECTING MULTISYNC

2.3.1 WITH THE IBM PC, PC/XT AND PC/AT

MultiSync, The Intelligent Monitor, can be used with IBM personal computers in the following configurations.

THE IBM PC

IBM PC equipped with either the IBM Color Graphics Adapter (CGA) or the IBM Enhanced Graphics Adapter (EGA).

▼ **Follow these steps**

1. Make sure the power to MultiSync and the IBM PC is turned off.
2. Make sure that the TTL/ANALOG switch on the rear of MultiSync is at TTL.
3. Make sure that the MANUAL SWITCH on the rear of MultiSync is at OFF.
4. Install either the IBM CGA or EGA according to the instructions accompanying the graphics cards. (Fig. 2.3)
5. Connect one end of the MultiSync signal cable to the interface on the graphics adapter and connect the other end of the MultiSync signal cable to the interface marked "SIGNAL INPUT" on the rear of MultiSync. (Fig. 2.4)

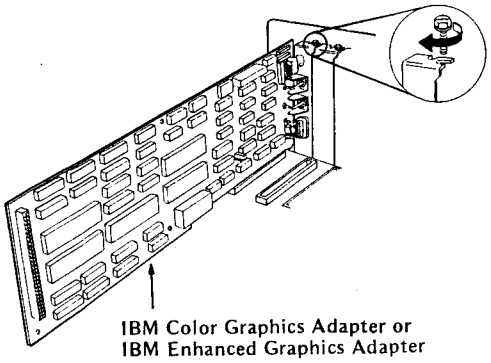


Fig. 2.3

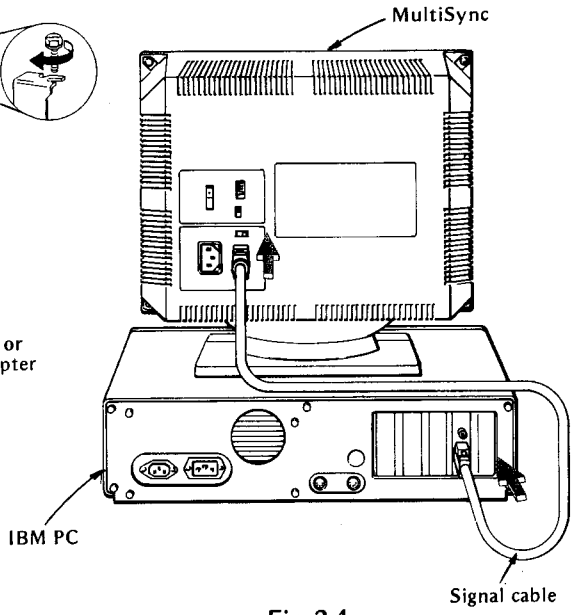


Fig. 2.4

THE IBM PC/XT

IBM PC/XT equipped with the IBM Color Graphics Adapter (CGA), the IBM Enhanced Graphics Adapter (EGA) or the IBM Professional Graphics Adapter (PGA).

▼ **Follow these steps**

1. Make sure the power to MultiSync and the IBM PC/XT is turned off.
2. Make sure that the TTL/ANALOG switch on the rear of MultiSync is at TTL when using the CGA and EGA or at ANALOG when using the PGA.
3. Make sure that the MANUAL SWITCH on the rear of MultiSync is at OFF.
4. Install the IBM CGA, EGA or PGA according to the instructions accompanying the graphics cards. (Fig. 2.5)
5. Connect one end of the MultiSync signal cable to the interface on the graphics adapter and connect the other end of the MultiSync signal cable to the interface marked "SIGNAL INPUT" on the rear of MultiSync. (Fig. 2.6)

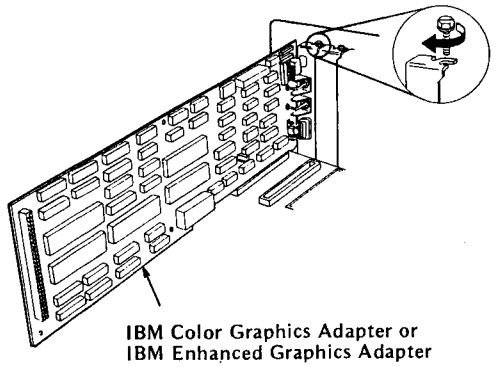


Fig. 2.5

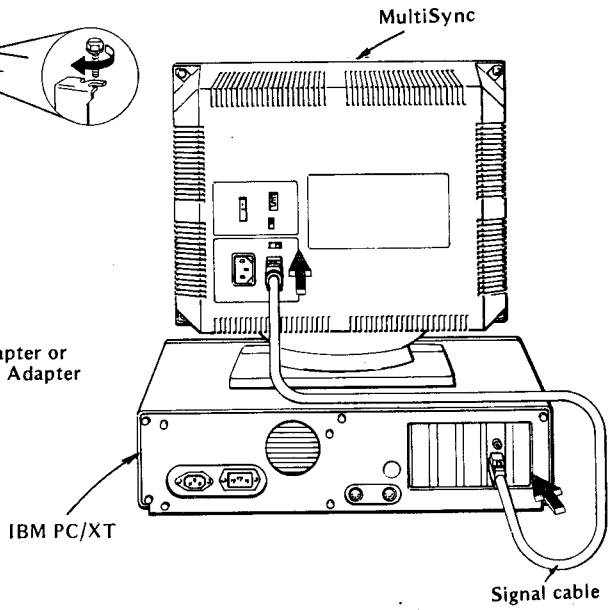


Fig. 2.6

THE IBM PC/AT

IBM PC/AT equipped with the IBM Color Graphics Adapter (CGA), the IBM Enhanced Graphics Adapter (EGA) or the IBM Professional Graphics Adapter (PGA).

▼ **Follow these steps**

1. Make sure the power to MultiSync and the IBM PC/AT is turned off.
2. Make sure that the TTL/ANALOG switch on the rear of MultiSync is at TTL when using the CGA and EGA or at ANALOG when using the PGA.
3. Make sure that the MANUAL SWITCH on the rear of MultiSync is at OFF.
4. Install the IBM CGA, EGA or PGA according to the instructions accompanying the graphics cards. (Fig. 2.7)
5. Connect one end of the MultiSync signal cable to the interface on the graphics adapter and connect the other end of the MultiSync signal cable to the interface marked "SIGNAL INPUT" on the rear of MultiSync. (Fig. 2.8)

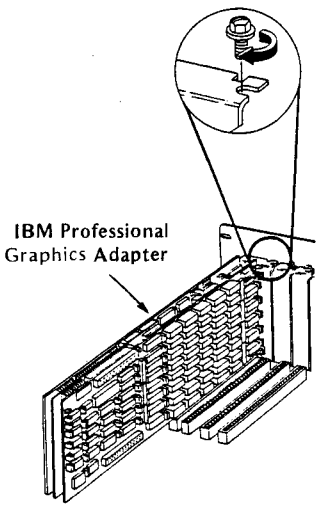


Fig. 2.7

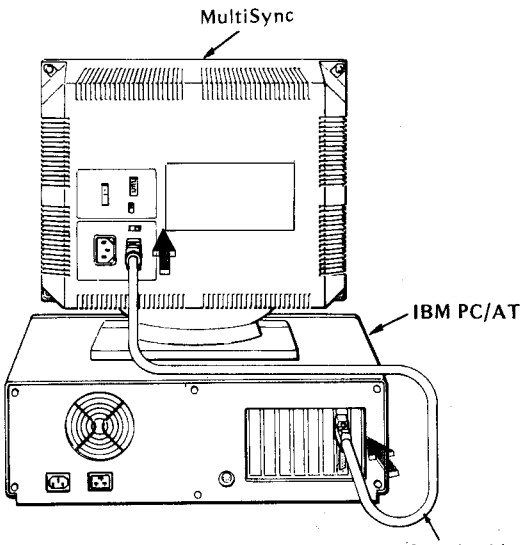


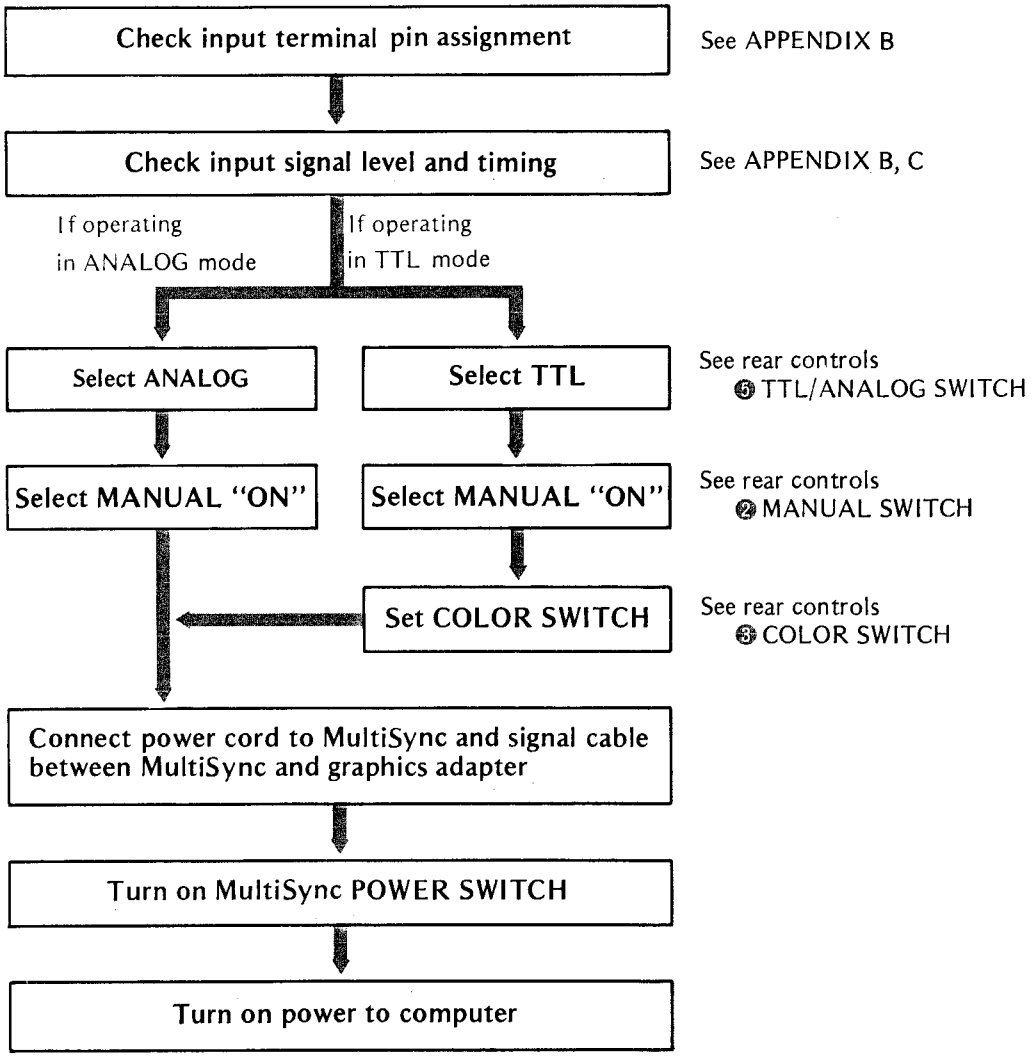
Fig. 2.8

For other IBM compatible graphics adapters not manufactured by IBM, a signal cable other than the one included in the MultiSync box may be necessary. Please refer to the manufacturer's instructions for installing the graphics adapter and for cabling information or contact your dealer.

2.3.2 WITH OTHER COMPUTERS

CAUTION

If your computer or graphics adapter is not IBM compatible, refer to the diagram below to determine compatibility or consult your authorized NEC Home Electronics dealer.


Check input terminal pin assignment
See APPENDIX B
Check input signal level and timing
See APPENDIX B, C
If operating in ANALOG mode
If operating in TTL mode
Select ANALOG
Select TTL
See rear controls ❺ TTL/ANALOG SWITCH
Select MANUAL "ON"
Select MANUAL "ON"
See rear controls ❷ MANUAL SWITCH
Set COLOR SWITCH
See rear controls ❸ COLOR SWITCH
Connect power cord to MultiSync and signal cable between MultiSync and graphics adapter
Turn on MultiSync POWER SWITCH
Turn on power to computer

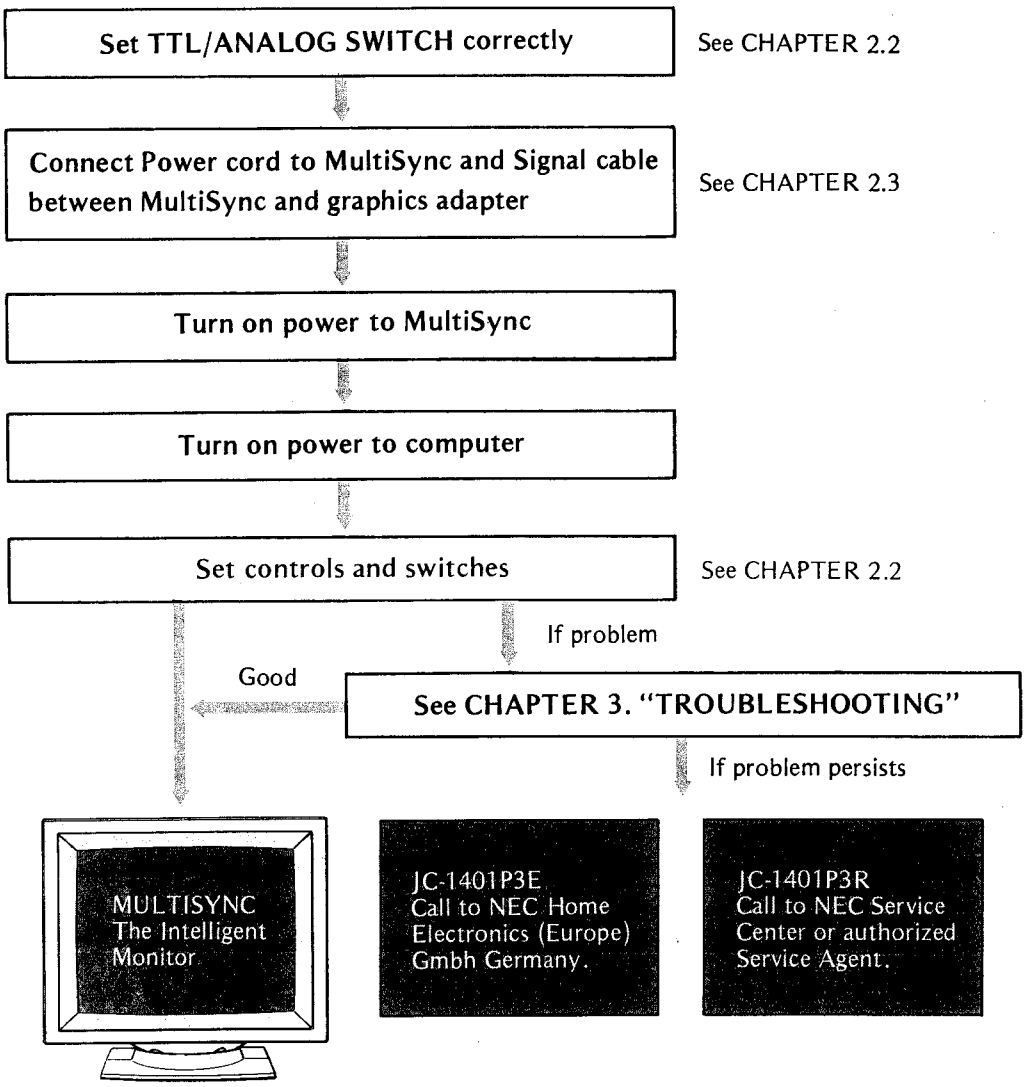
2.4 QUICK OPERATION CHART

To summarize the steps in connecting your computer and adapter with MultiSync and setting the necessary controls and switches, refer to the chart below.

CAUTION

Before making any connections, please make sure the setting of the TTL/ANALOG SWITCH correctly matches the signal output of your computer and the graphics adapter especially the signal pin assignments. Refer to instructions accompanying the graphics adapter for information on signal input.

(If the TTL/ANALOG SWITCH is improperly selected, it may result in severe damage to your computer, your graphics adapter and Multisync.)



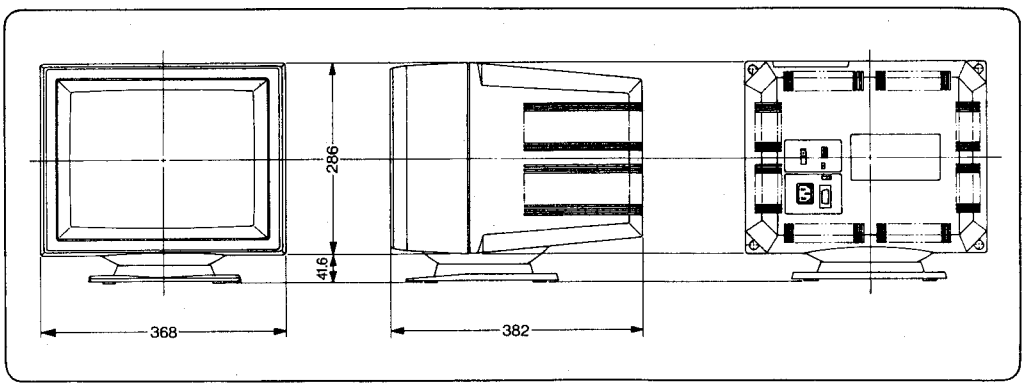
CHAPTER 3. TROUBLE SHOOTING

Before calling NEC or an authorized service center, please check that the following items are properly connected or set.
If an unrecommended computer is connected, make sure the signal timing and pin assignments meet the specifications outlined in Appendix B or C.

PROBLEM	CHECK THESE ITEMS	
	CONTROLS SWITCHES	LOCATION
No picture	POWER SWITCH signal cable	Rear
Abnormal picture		
1. Fuzzy	TTL/ANALOG SWITCH	Rear
2. 16 or 64 colors do not correctly display when connected to an IBM graphics adapter	MANUAL SWITCH should be "OFF".	Rear
3. 16 or 64 colors do not correctly display in manual mode with non IBM	MANUAL SWITCH should be "ON". 8/16/64 colors should be selected with dip switches 5, 6.	Rear
4. Display scrolls up or down	V. HOLD CONTROL	Top
5. Display locks or center shifts	V. POSITION, H. POSITION	Top
6. Display is too large or too small	V. SIZE CONTROL H. WIDTH SWITCH	Top
7. Vertical size of display too small with IBM PGA at 400 lines	MANUAL SWITCH should be "OFF".	Rear
8. Only one color appears	TEXT SWITCH should be "OFF" without "Text Mode".	Top

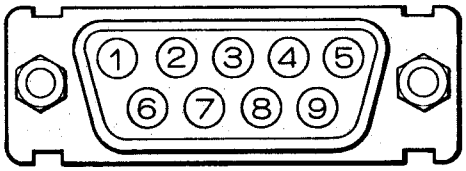
APPENDIX A SPECIFICATIONS

Picture Tube	370 HYB22 13 Visual inches diagonal 90 degree deflection, 0.31 mm Trio dot pitch Dot type black matrix, Non-long persistence phosphor, Dark bulb, Direct etch
Input Signal	Video : TTL Level Positive : ANALOG 0.6Vp-p/75Ω Positive Sync. : Separate sync. TTL Level Horizontal sync. Positive/Negative Vertical sync. Positive/Negative : Composite sync. TTL Level Positive/Negative : Composite sync. on Green Video sync. 0.3 Vp-p Negative (Video 0.6 Vp-p Positive)
Display Colors	TTL Input : 8/16/64 colors Analog Input : Unlimited colors
Synchronization	Horizontal : 15.5 KHz to 35 KHz (Automatically) Vertical : 56 Hz to 62 Hz (Manual), Non-interlace
Resolution	Horizontal : 800 dots Vertical : 560 lines
Video Band Width	30 MHz
Maximum Display Area	Horizontal : 250mm (Active display area is Vertical : 180mm changed by signal timing.)
Misconvergence	Less than 0.6mm
Power Supply	AC 220–240V, 50/60 Hz
Power Consumption	78 W
Dimensions	368(W) x 327.6(H) x 382(D) mm
Weight	15.2kg
Environmental Considerations	Operating Temperature 0°C to +40°C Humidity 30% to 80% Storage Temperature −20°C to +60°C Humidity 10% to 90%



APPENDIX B
PIN ASSIGNMENTS AND SIGNAL LEVELS

D-SUB Type 9P



PIN ASSIGNMENT OF IBM GRAPHICS ADAPTER

IBM ADAPTERS / PIN-ASSIGNMENT	COLOR GRAPHICS TTL 16 COLORS	ENHANCED GRAPHICS TTL 64/16 COLORS	PROFESSIONAL GRAPHICS ANALOG
1	GROUND	GROUND	* RED
2	GROUND	SECONDARY RED	* GREEN
3	RED	PRIMARY RED	* BLUE
4	GREEN	PRIMARY GREEN	COMPOSITE SYNC
5	BLUE	PRIMARY BLUE	MODE CONTROL
6	INTENSITY	SECONDARY GREEN /INTENSITY	RED GROUND
7	NON-CONNECTION	SECONDARY BLUE	GREEN GROUND
8	HORIZONTAL SYNC	HORIZONTAL SYNC	BLUE GROUND
9	VERTICAL SYNC	VERTICAL SYNC	GROUND

PIN ASSIGNMENT OF OTHER COMPUTERS

SIGNAL / PIN-ASSIGNMENT	TTL			ANALOG		
	8 COLORS	16 COLORS	64 COLORS	SEPARATE SYNC.	COMPOSITE SYNC.	SYNC. ON GREEN
1	GROUND			* RED		
2	——		SECONDARY RED	* GREEN		GREEN ◎ H/V SYNC
3	RED		PRIMARY RED	* BLUE		
4	GREEN		PRIMARY GREEN	H. SYNC.	H/V SYNC.	——
5	BLUE		PRIMARY BLUE	V. SYNC.	——	
6	——	INTENSITY	SECONDARY GREEN	GROUND		
7	——		SECONDARY BLUE			
8	H. SYNC. / H/V SYNC.					
9	V. SYNC.					

"——" means GROUND or NON-CONNECTION

SIGNAL LEVEL

All signal level, except for those listed below, is TTL.

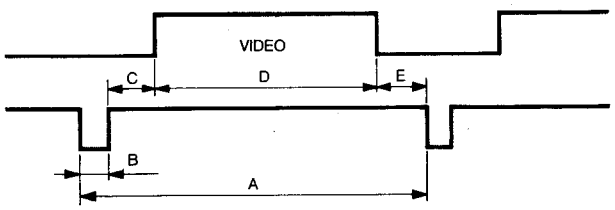
"*" means 0.6 Vp-p (VIDEO)

"◎" means 0.6 Vp-p (VIDEO), 0.3 Vp-p (SYNC)

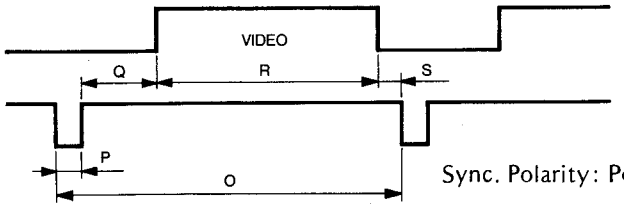
APPENDIX C TIMING CHARTS

SEPARATE SYNC.

HORIZONTAL



VERTICAL



Sync. Polarity: Positive/Negative

	f_H	EXAMPLE TIMING 15.75kHz	24.83kHz	30.1kHz	REMARKS
Horizontal	$A_{\mu s}$	63.5	40.28	33.2	64.5 to 28.6μs (15.5 to 35kHz)
	$B_{\mu s}$	5.08	3.04	3.43	2 to 10μs
	$C_{\mu s}$	7.62	2.80	2.86	2 to 8μs
	$D_{\mu s}$	46.3	32.4	25.76	20 to 48μs *
	$E_{\mu s}$	4.4	2.04	1.14	1 to 6μs and E/(B + C) = 0.1 to 0.45 Range 1: E/(B+C) = 0.3 to 0.5
Vertical	O_{mS}	16.6	17.72	17.66	16.1 to 17.8 mS (56 to 62Hz)
	P_{mS}	0.26	0.32	0.26	0.05 to 0.7 mS
	Q_{mS}	1.6	1.01	0.73	0.08 to 2.2 mS
	R_{mS}	13.84	16.11	16.6	12 to 17 mS and (O – R) = 0.8 to 4.0
	S_{mS}	0.9	0.28	0.066	0 to 1.6 mS and Q = [(O – R) – 0.8]/2 ±0.2

Range 1: A = 64.5 to 50μs
Range 2: A = 50 to 37μs
Range 3: A = 37 to 28.6μs

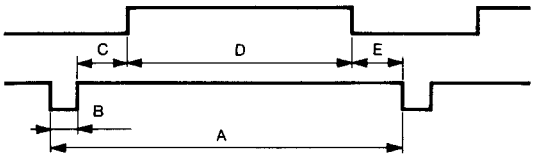
* Both SEPARATE SYNC. & COMPOSITE SYNC.
Range 1: D/A = 0.7~0.75
Range 2: D/A = 0.8~0.85
Range 3: D/A = 0.75~0.8

PRESET TIMING

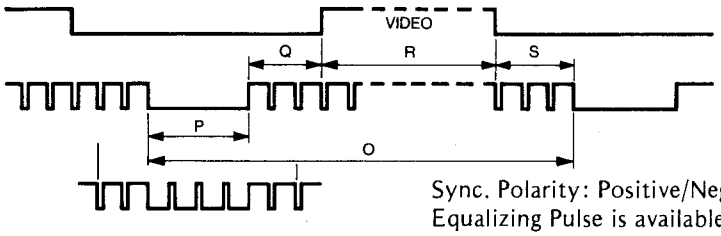
	f_H	15.8kHz	22kHz	30.5kHz		f_H	15.8kHz	22kHz	30.5kHz
Horizontal	$A_{\mu s}$	63	45.5	33	Vertical	O_{mS}	16.4	16.68	16.6
	$B_{\mu s}$	4.2	4.9	4.5		P_{mS}	0.075	0.6	0.07
	$C_{\mu s}$	7.2	1.6	2.8		Q_{mS}	1.525	0.08	2.12
	$D_{\mu s}$	45	39	25.6		R_{mS}	12.6	16	13.05
	$E_{\mu s}$	6.6	0	0.1		S_{mS}	2.2	0	1.36

COMPOSITE SYNC.

HORIZONTAL



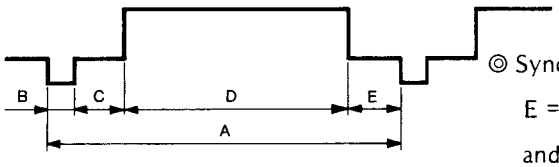
VERTICAL



Sync. Polarity: Positive/Negative
Equalizing Pulse is available.

Composite Sync. & Video (Sync. on Green)

HORIZONTAL

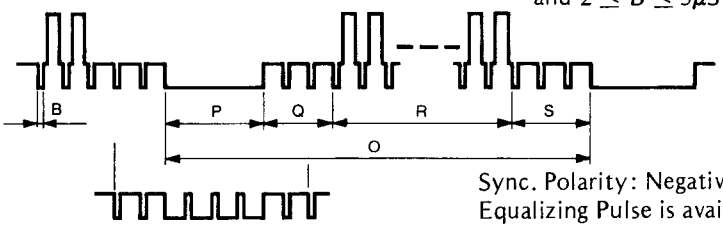


◎ Sync on G:

$$E = \frac{A-(D+B)\pm(5-B)}{2}$$

and $2 \leq B \leq 5\mu S$

VERTICAL



Sync. Polarity: Negative
Equalizing Pulse is available.

	f_H	EXAMPLE TIMING			REMARKS
		15.98kHz	25.5kHz	31.5kHz	
Horizontal	$A_{\mu s}$	62.6	39.2	31.75	64.5 to 28.6μs (15.5 to 35kHz)
	$B_{\mu s}$	5.41	2.51	2.06	2 to 10μs
	$C_{\mu s}$	8.0	3.30	3.62	3.3 to 8μs
	$D_{\mu s}$	44.7	32.14	24.52	20 to 48μs *
	$E_{\mu s}$	4.47	1.25	1.56	1 to 6μs and E/(B + C) = 0.1 to 0.45 Range 1: E/(B+C) = 0.3 to 0.5 ◎
Vertical	O_{mS}	16.35	16.67	16.67	16.1 to 17.8 mS (56 to 62Hz)
	P_{mS}	0.19	0.12	0.19	0.05 to 0.19 mS
	Q_{mS}	1.82	0.80	1.02	0.8 to 2.2 mS
	R_{mS}	13.47	15.63	15.24	12 to 17 mS and (O − R) = 0.8 to 4.0
	S_{mS}	0.87	0.12	0.22	0 to 1.6 mS and Q = [(O−R)−0.8]/2±0.2

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